

# RESERVE COPY

## PATENT SPECIFICATION



Application Date: March 23, 1937. No. 8561 /37.

492,715

Complete Specification Left: April 21, 1938.

Complete Specification Accepted: Sept. 23, 1938.

### PROVISIONAL SPECIFICATION

#### ERRATUM

SPECIFICATION No. 492,715.

On page 4, delete line 41 and insert "end  
to end in arcuate form around the "

THE PATENT OFFICE,  
January 12th, 1939.

mounted at the respective ends of the course of the escalator in such position and relation that a part of the endless band or bands or the equivalent extends 25 transversely in the path of and against the outer parts of the steps as they move downwardly or upwardly as the case may be, while they are reversed in position, whereby the steps are subject to stresses 30 that hold them and prevent the free fall of the trailing rollers at each side from one surface of the track to the other, the steps being allowed slowly to fall on being held by the band or bands as they 35 pass into and out of the curvilinear path.

The invention comprises the constructional features hereinafter described.

In carrying the invention into effect according to one construction a pair of 40 endless bands are provided adjacent the curvilinear paths at the respective ends of the escalator, the endless bands being advantageously provided of rubber and canvas belting. Each of the endless 45 bands is mounted upon sets of rollers at each side of the centre of the supporting frame and so supported that the endless bands at their upper part extend rearwardly and in front pass over a top pulley 50 adjacent the upper part of the curvilinear path of the steps to a lower pulley near the lower part of the path, the respective upper and lower pulleys being so dis-

adjacent lengths of the endless bands, the end pulleys upon which the rearwardly diverted parts of the endless bands are passed are carried by spindles mounted to slide within oppositely disposed slots, whereby the end pulleys are permitted a substantial extent of movement forward against the resistance of springs, which may be provided of a helical form and mounted upon rods, the ends of which are connected to bosses carried at the respective ends of the spindles, while the forward ends of the rods are supported in brackets which serve as abutments for the opposite ends of the helical springs. It will thus be understood that the respective endless 75 bands pass forward from the end pulleys to corresponding pulleys in front and in line near the upper part and adjacent the curvilinear end path of the steps, the endless bands then passing downwardly 80 across the curvilinear path of the steps and in contact with the steps to lower pulleys set in position beneath, thence returning to other pulleys above set to the rear of the upper pulleys already referred 85 to, thence again to pass under and over the adjustable end pulleys. It will thus be understood that the spindles of the pulleys upon which the upper part of the endless bands are mounted may be supported between parallel disposed longi- 95 100 105

[Price 1/-]

BEST AVAILABLE COPY

# RESERVE COPY

## PATENT SPECIFICATION



Application Date: March 23, 1937. No. 8561/37.

492,715

Complete Specification Left: April 21, 1938.

Complete Specification Accepted: Sept. 23, 1938.

### PROVISIONAL SPECIFICATION

#### Improvements relating to Escalators and like Apparatus

We, J. & E. HALL LIMITED, of 10, St. Swithin's Lane, London, E.C.4, a British joint-stock Corporation, and JOHN ALBERT MAY, of 177, Firhill Road, 5 Catford, London, S.E.6, of British Nationality, do hereby declare the nature of this invention to be as follows:—

In the operation of escalators as usually constructed noise occurs on the inversion of position of the steps in the course of their movement in a curvilinear path at the end of their upward or downward course by reason of the trailing rollers 15 dropping from the upper to the lower track surface.

The present invention has among its objects to prevent or to reduce this noise.

According to the invention an endless band or bands or the equivalent is or are mounted at the respective ends of the course of the escalator in such position and relation that a part of the endless band or bands or the equivalent extends 25 transversely in the path of and against the outer parts of the steps as they move downwardly or upwardly as the case may be, while they are reversed in position, whereby the steps are subject to stresses 30 that hold them and prevent the free fall of the trailing rollers at each side from one surface of the track to the other, the steps being allowed slowly to fall on being held by the band or bands as they 35 pass into and out of the curvilinear path.

The invention comprises the constructional features hereinafter described.

In carrying the invention into effect according to one construction a pair of 40 endless bands are provided adjacent the curvilinear paths at the respective ends of the escalator, the endless bands being advantageously provided of rubber and canvas belting. Each of the endless 45 bands is mounted upon sets of rollers at each side of the centre of the supporting frame and so supported that the endless bands at their upper part extend rearwardly and in front pass over a top pulley 50 adjacent the upper part of the curvilinear path of the steps to a lower pulley near the lower part of the path, the respective upper and lower pulleys being so dis-

posed as the steps pass into the curvilinear path of their course they come into contact with that part of the respective bands that extend between the upper and lower pulleys, causing those parts to recede to such an extent that pressure is first imposed upon the forward end of a step, then upon the normal top face of that step and then at the rear thereof, the pressure being slowly reduced as the step approaches the lower position of its contact with the endless bands, whereby the trailing rollers of each of the steps are thus held by the endless band and they slowly pass from one track surface to the opposite track surface between which the trailing rollers run. For the purpose of accommodating the steps in the respective positions they assume as they pass into contact with the respective adjacent lengths of the endless bands, the end pulleys upon which the rearwardly diverted parts of the endless bands are passed are carried by spindles mounted to slide within oppositely disposed slots, whereby the end pulleys are permitted a substantial extent of movement forward against the resistance of springs, which may be provided of a helical form and mounted upon rods, the ends of which are connected to bosses carried at the respective ends of the spindles, while the forward ends of the rods are supported in brackets which serve as abutments for the opposite ends of the helical springs. It will thus be understood that the respective endless bands pass forward from the end pulleys to corresponding pulleys in front and in line near the upper part and adjacent the curvilinear end path of the steps, the endless bands then passing downwardly across the curvilinear path of the steps and in contact with the steps to lower pulleys set in position beneath, thence returning to other pulleys above set to the rear of the upper pulleys already referred to, thence again to pass under and over the adjustable end pulleys. It will thus be understood that the spindles of the pulleys upon which the upper part of the endless bands are mounted may be supported between parallel disposed longi-

[Price 1/-]

tudinal frame members which in turn are supported by transversely disposed frame members or joists, and that the lower pulleys may be supported in brackets carried by transversely disposed frame members or joists.

It will be understood that any other means than hereinbefore described may be provided to permit accommodation of 10 the endless bands to the particular posi-

tions assumed by the steps in their movement in the curvilinear paths and that the endless bands may be made of any other material than rubber and canvas belting.

15

Dated the 23rd day of March, 1937.

EDWARD EVANS & Co.  
40—43, Chancery Lane, London, W.C.2,  
Agents for the Applicants.

## COMPLETE SPECIFICATION

### Improvements relating to Escalators and like Apparatus

We, J. & E. HALL LIMITED, of 10, St. Swithin's Lane, London, E.C.4, a British joint-stock Corporation, and JOHN ALBERT MAY, of 177, Firhill Road, Catford, London, S.E.6, of British Nationality, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained 25 in and by the following statement:—

In the operation of escalators as usually constructed noise occurs on the inversion of position of the steps in the course of their movement in a curvilinear path at 30 the end of their upward or downward course by reason of the trailing rollers dropping from the upper to the lower track surface.

The present invention has among its 35 objects to prevent or to reduce this noise.

According to the invention the escalators and like apparatus include a device for preventing the noise caused by the trailing rollers of the steps falling from 40 one of the pair of fixed curved rails at the ends of the escalator to the other in the inversion of the position of the steps while moving in a curvilinear path at the top and/or bottom of the escalator. the 45 device comprising means which bear resiliently against the steps or a component part or parts of the step to exert a pressure on the steps or a part or parts thereof to cause the trailing rollers to be 50 moved smoothly and silently from one rail to the other. The means may comprise an endless band, belt or chain mounted on pulleys or the like at the top and/or bottom of the escalator and so disposed relatively thereto that as the steps 55 pass into the curvilinear path they come into contact with the endless band, belt or chain and are caused to recede to such an extent that the trailing rollers are 60 caused to move smoothly and silently from one rail to the other.

The invention further comprises the constructional features hereinafter described.

The invention is diagrammatically 65 illustrated by way of example in the accompanying drawings, in which

Figure 1 is a sectional side elevation of a device according to the invention as applied to the upper end of an escalator. 70

Figure 2 is a half plan view of the device illustrated in Figure 1.

Figure 3 is a corresponding side elevation on an enlarged scale of a modified construction of the device according to 75 the invention.

Figure 4 is a side elevation of the device illustrated in Figure 3 as applied to the lower end of an escalator.

In carrying the invention into effect 80 according to the construction illustrated in Figures 1 and 2 of the accompanying drawings which shows one of an adjacently disposed pair of devices according to the invention as applied to the upper 85 end of an escalator, an endless band or belt  $\alpha$  is mounted on pulleys  $b$ ,  $b^1$ ,  $b^2$  and  $b^3$  to lie in a substantially vertical plane adjacent the curvilinear path of the steps  $c$  of the escalator as they move from a 90 position in which the trailing rollers  $d$  of the steps travel on the inner rail or surface  $e$  to the position in which the steps are reversed and the trailing rollers travel on the outer rail or surface  $f$ . 95

The endless band or belt  $\alpha$  may be passed around and in front of the upper pulley  $b$  and the lower pulley  $b^1$ , the spindle of the upper pulley  $b$  being rotatably mounted between parallel 100 longitudinal frame members  $g$  in a main supporting frame  $h$  at the end of the escalator, and themselves supported by transversely disposed frame members or joists  $j^1$ ; the lower pulley  $b^1$  is supported in brackets  $i$  carried by transversely disposed frame members or joists  $i^1$  in a plane slightly forward of the vertical plane of the upper pulley  $b$ .

On the upper frame members  $g$  are 110 mounted, in addition to the pulley  $b$ , the two pulleys  $b^2$  and  $b^3$ , the pulley  $b^2$  being mounted to the rear and slightly

below the pulley  $b$  and serving as a guide-pulley, and the pulley  $b^2$  being mounted to the rear of the guide-pulley  $b^2$  and at the same level as the pulley  $b$  on a spindle 5 which is adapted to slide against spring pressure within oppositely disposed slots  $k$ , whereby the pulley  $b^2$  is permitted a substantial extent of movement forward against the resistance of springs  $k^1$  which 10 are provided as helical springs mounted upon rods  $k^2$ , the ends of the rods being connected to bosses  $k^3$  carried at the respective sides of the spindles, while the forward ends of the rods  $k^2$  are supported 15 in brackets  $k^4$  which serve as abutments for the opposite ends of the helical springs  $k^1$ .

It will thus be understood that the endless band or belt  $a$  passes forward from 20 the end pulley  $b^1$  to the corresponding pulley  $b$  in front and in alignment with it and then downwardly across the curvilinear path of the steps and in contact with the steps to the lower pulley 25  $b^1$  set in position on the bracket  $i$  beneath, thence returning to pass over the guide pulley  $b^2$  and back to the rear of the pulley  $b^1$ .

The respective upper and lower pulleys 30  $b$  and  $b^1$  are so disposed that as the steps  $c$  pass into the curvilinear path of their travel they come into contact with that part of the band or belt  $a$  that extends between the upper and lower pulleys  $b$  35 and  $b^1$  causing that part of the band or belt to recede to such an extent that pressure is first imposed upon the forward end  $c^1$  of a step, then upon the normal top face  $c^2$  of that step and then at the 40 rear  $c^3$  thereof, the pressure being slowly and uniformly reduced as the step approaches the lower position of its contact with the endless band or belt, whereby the trailing rollers  $d$  of each of 45 the steps are thus supported by the endless band or belt, and pass slowly, smoothly and silently from the surface of the inner track  $e$  to the surface of the outer track  $f$  between which the rollers 50  $d$  run.

The electric motor for driving the escalator is indicated by the reference  $l$ .

Instead of providing a substantially non-resilient and inelastic belt with 55 resiliently mounted pulleys or the equivalent, the endless band or belt may itself be formed of an elastic or resilient material, such as rubberised fabric.

Figures 3 and 4 of the drawings illustrate modified constructions of apparatus according to the invention in which the necessary resilience is supplied by the endless band itself.

In this construction upper and lower 65 pulleys  $m$  and  $m^1$  respectively are pro-

vided as in the construction described with reference to Figures 1 and 2, the pulleys being respectively mounted on upper and lower brackets  $n$  and  $n^1$ .

Mounted to the rear and below the pulley  $m$  on the upper bracket  $n$  and to the rear and above the pulley  $m^1$  on the lower bracket  $n^1$  are respectively pulleys  $o$  and  $o^1$  which serve to space the endless band  $a$  so that it does not contact in its movement under the influence of the steps.

The pulleys  $o$  and  $o^1$  are mounted in horizontally extending slots  $p$  and  $p^1$  respectively so that their positions may 80 be adjusted in the slots in accordance with the tension required in the endless band or belt  $a$ .

The positions assumed by each step  $c$  and its trailing roller  $d$  during the travel of the roller on the curvilinear path in contact with the inner rail  $e$  to the reversed position of the step in which the trailing roller  $d$  is travelling along the outer rail  $f$  is clearly indicated by dotted 90 lines in Figure 3.

It will be appreciated that in the travel of the steps in a curvilinear path at the top of the escalator the device according to the invention serves partly to support 95 the weight of the step in the downward travel of the step into the reversed position as the trailing roller moves from contact with the inner rail into contact with the outer rail. In the movement of 100 the steps in a curvilinear path at the bottom of the escalator however it will be necessary to effect the transfer of the trailing roller of each step from the outer to the inner rail at a position before the 105 step reaches the position in which it falls in the inversion of its position, since at that position the falling movement of the step will then be in a direction away from the endless band or belt which will therefore be unable to prevent it. Accordingly the endless band or belt is caused to bear against the steps at a position such that the transfer of the trailing roller from the outer to the inner rail is 110 effected by pressure applied by the endless band or belt before the position is reached at which the roller would have otherwise fallen from the outer into the inner rail had the device according to the 115 invention not been applied to the escalator.

Thus in contradistinction to the operation of the device in its application at the top of an escalator in which it operates to 125 damp the fall of the trailing rollers from the inner rail to the outer, the device in its application at the bottom of the escalator operates to apply a positive pressure to lift the trailing roller from 130

the outer rail to the inner rail. Thus the endless band or belt will require to be so disposed in relation to the curvilinear path of the steps and of sufficient resilience to be adapted to apply a pressure to lift the trailing rollers from the lower rail to run on the upper rail and to maintain the roller in contact until the step has reached a position on the curvilinear path in which its weight is sufficient to maintain the roller on the inner rail. Thus it will be understood that a greater tension will require to be maintained on the endless band or belt at the bottom of the escalator than at the top.

The endless band or belt of the constructions hereinbefore described may be substituted by equivalent means, such for example as a resiliently mounted shoe-member or shoe-members which are adapted to be applied at the top and/or bottom of the escalator to contact with the steps in their curvilinear path so as to provide a support by means of which the trailing rollers of the steps may be caused to pass smoothly and silently from the inner rail to the outer rail.

Furthermore it will be understood that more than one endless band or belt or equivalent means may be provided disposed side by side to bear against the flat tread of the step or against any other part thereof, by means of which the step may be supported during that part of the travel in the curvilinear path in which the trailing roller moves from one rail to the other.

Furthermore a number of endless bands or belts may be provided disposed and uniformly reduced as the step curvilinear path of the steps for the purpose specified, each band or belt supporting the step along one part of its travel along the curvilinear path.

Furthermore means may be provided which are adapted to make a positive synchronised movement to engage each step or a part thereof at the predetermined appropriate position in its travel along the curvilinear path to cause the trailing rollers to pass from the inner rail to the outer or vice versa as desired.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. A device for use with escalators and like apparatus for preventing the noise caused by the trailing rollers of the steps

falling from one of the pair of fixed curved rails at the ends of the escalator to the other in the inversion of the position of the steps while moving in a curvilinear path at the top and/or bottom of the escalator, comprising means which bear resiliently against the steps or a component part or parts of the step to exert a pressure on the steps or a part or parts thereof to cause the trailing rollers to be moved smoothly and silently from one rail to the other.

2. A device for use in escalators and like apparatus according to claim 1, in which the means comprise an endless band, belt or chain mounted on pulleys or the like at the top and/or bottom of the escalator and so disposed relatively thereto that as the steps pass into the curvilinear path they come into contact with the endless band, belt or chain and are caused to recede to such an extent that the trailing rollers are caused to move smoothly and silently from one rail to the other.

3. A device for use in escalators and like apparatus according to claim 2, in which one or more of the pulleys or the like is or are resiliently mounted.

4. A device for use in escalators and like apparatus according to claim 1 or 2, in which the endless belt, or band is provided of a resilient material such as a rubberised fabric.

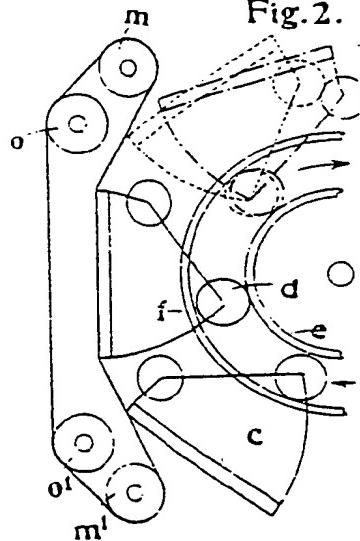
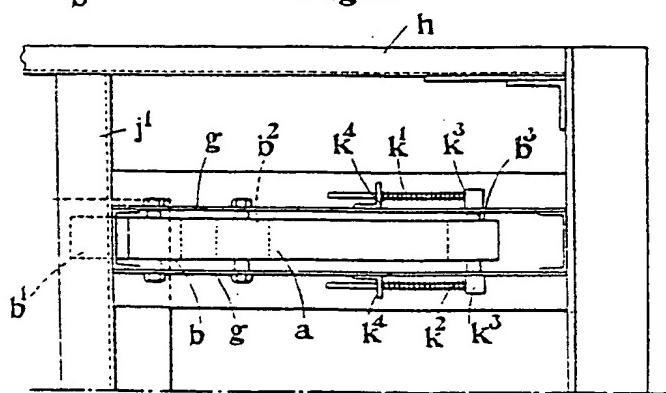
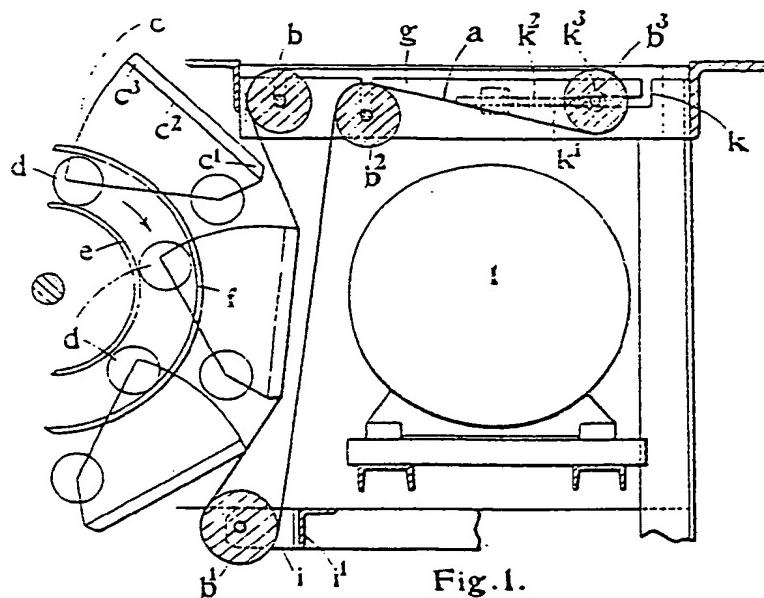
5. A device for use in escalators and like apparatus according to claim 1, in which a resiliently mounted shoe or shoe members is or are provided disposed end to end in arcuate form so as substantially to follow the curvilinear path of the steps so as to support the trailing rollers of the steps and ensure their silent transfer from one rail to another.

6. A device for use in escalators and like apparatus according to claim 1 or 2, in which means are provided for adjusting the tension in the endless band, belt or chain.

7. A device for use in escalators and like apparatus substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

8. A device for use in escalators and like apparatus substantially as hereinbefore described with reference to Figures 3 and 4 of the accompanying drawings.

Dated this 20th day of April, 1938.  
EDWARD EVANS & Co.,  
40.—43, Chancery Lane, London, W.C.2.  
Agents for the Applicants.



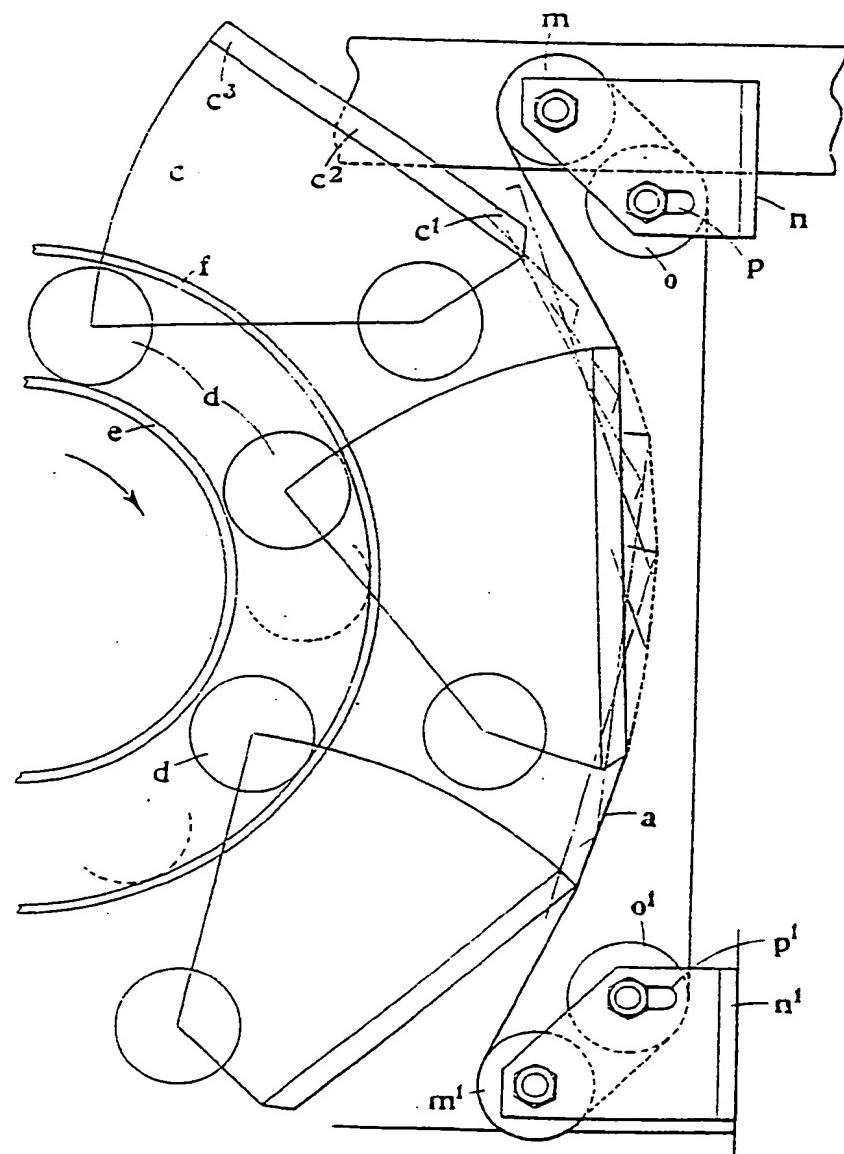


Fig. 3.

192715 COMPLETE SPECIFICATION

SHEET 1

(This drawing is a reproduction of the original on a reduced scale.)

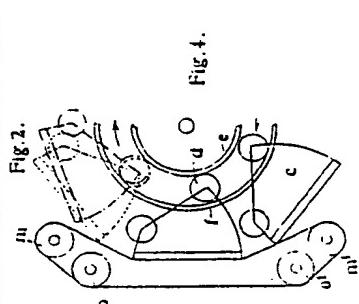
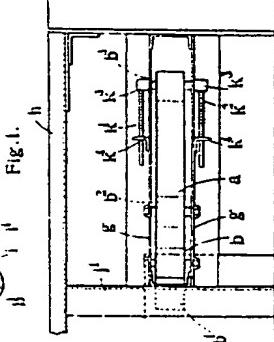
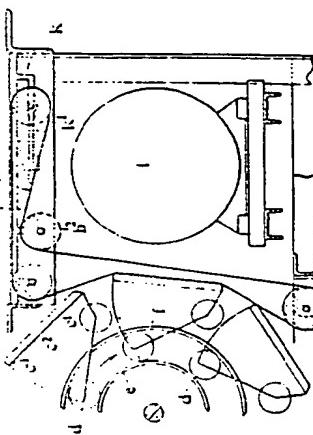


Fig. 3.

SHEET 2

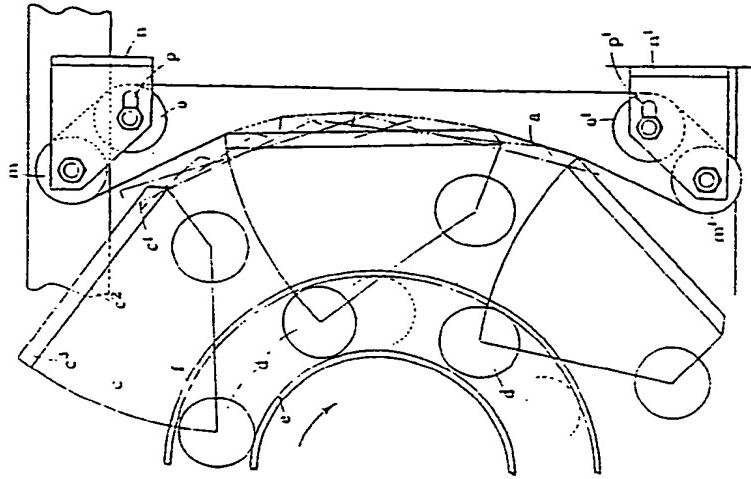


Fig. 4.

Sheet 1 of 2

**This Page is Inserted by IFW Indexing and Scanning  
Operations and is not part of the Official Record**

**BEST AVAILABLE IMAGES**

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- BLACK BORDERS**
- IMAGE CUT OFF AT TOP, BOTTOM OR SIDES**
- FADED TEXT OR DRAWING**
- BLURRED OR ILLEGIBLE TEXT OR DRAWING**
- SKEWED/SLANTED IMAGES**
- COLOR OR BLACK AND WHITE PHOTOGRAPHS**
- GRAY SCALE DOCUMENTS**
- LINES OR MARKS ON ORIGINAL DOCUMENT**
- REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY**
- OTHER:** \_\_\_\_\_

**IMAGES ARE BEST AVAILABLE COPY.**

**As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.**